ABSTRACT OF THE DISCLOSURE

OPTICAL PARAMETRIC DEVICES AND METHODS FOR MAKING SAME

An optical parametric device for broadband parametric processes involving first and second frequencies ω_1 and ω_2. The device comprises an optical fiber comprising a core and a cladding, the cladding being microstructured with holes for providing waveguiding confinement of at least one optical mode in the core. The optical fiber is poled lengthwise with a non-linearity profile having a period that satisfies a quasi phase matching (QPM) condition including the first and second frequencies. Through the use of a poled holey fiber of suitable hole structure, it is possible to increase the second harmonic (SH) efficiency in comparison with poled conventional (non-holey) fiber. This is achieved by a combination of a low mode overlap area between the fundamental and SH waves, a low absolute value of the mode area, and a large SH bandwidth per unit length of the fiber, all of which can be provided together in a poled holey fiber.